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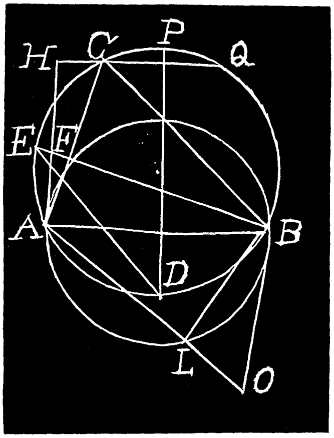
tion in h, $h^2-2(d-a\tan\frac{1}{2}A)h=a^2-d^2$. This quadratic is easily constructed, and after having h the construction of the triangles is very easy.

Solved similarly by V. M. Spunar.

II. **Solution by G. B. M. ZERR, A. M., Ph. D., Philadelphia, Pa.**

Let $AB=a$ be the base, ACB the given vertical angle, $p=z-(q-y)$ where z=altitude; x, y the remaining sides, respectively. On AB describe the segment of the circle containing the given vertical angle. Draw the diameter PD perpendicular to AB. Take $DE=AB$ and draw BE. Erect AF perpendicular to AB and also describe a circle on AB as diameter. Draw a line $AL=p$ meeting this circumference in L. Draw LB. Take $LO=AL-AF$ where LO is AL produced. Draw BO. Produce AF to H making $AH=BO+LO$, and draw HCQ parallel to AB. Then ACB is the triangle required. For $xy\sin C=az$, $x-y=z-p$, $a^2=x^2+y^2-2xy\cos C$. Hence $(z-p)^2=a^2-2xy(1-\cos C)=a^2-2az\tan\frac{1}{2}C$.



$\therefore z=p-a\tan\frac{1}{2}C+\sqrt{[(p-a\tan\frac{1}{2}C)^2+a^2-p^2]}$.

$\angle ABE=\frac{1}{2}C$, $AF=a\tan\frac{1}{2}C$, $AL=p$, $BL=\sqrt{[a^2-p^2]}$.
$LO=p-a\tan\frac{1}{2}C$, $BO=\sqrt{[(p-a\tan\frac{1}{2}C)^2=a^2-p^2]}$.
$\therefore AH=z$ and ABC is the required triangle.

CALCULUS.

292. **Proposed by J. SCHEFFER, A. M., Hagerstown, Md.**

Integrate the partial differential equation, $x^2\frac{\partial z}{\partial x}+y^2\frac{\partial z}{\partial y}=axy$.

Solution by PROF. W. W. BEMAN, University of Michigan.

This is problem 12, page 297, of Johnson's *Differential Equations*.

$$\frac{dx}{x^2}=\frac{dy}{y^2}=\frac{dz}{dxy}.$$

From the first two fractions,

$$\frac{1}{x}-\frac{1}{y}=i. \quad \therefore x=\frac{y}{1+cy}.$$

Substituting this value of x in the last two fractions,

$$\frac{dz}{a}=\frac{dy}{1+cy}, \text{ or } z=\frac{a}{c}\log(1+cy)+c'.$$

Replacing c by $\frac{1}{x}-\frac{1}{y}$, $z=\frac{axy}{y-x}\log\frac{y}{x}+\phi\left(\frac{1}{x}-\frac{1}{y}\right)$.

Also solved similarly by J. Scheffer, and G. B. M. Zerr.

293. Proposed by V. M. SPUNAR, M. and E. E., East Pittsburg, Pa.

Find the length of the integral curve of the differential equation $(y^2x^{\frac{4}{3}}+2)dx-x^{\frac{4}{3}}dy=0$ between $x_1=1$ and $x_2=8$.

Solution by G. B. M. ZERR, A. M., Ph. D., Philadelphia, Pa.

Let $y=-1/z$, $x^{-\frac{1}{3}}=v$, then the equation becomes $dz+6z^2dv+3v^{-4}dv=0$.

Now, let $z=\frac{1}{6v}+\frac{u}{v^2}$.

Then $v^2du+6u^2dv+3dv=0$, or $\frac{du}{3+6u^2}=-\frac{dv}{v^2}$.

$$\therefore \frac{1}{3\sqrt{2}}\tan^{-1}(u\sqrt{2})=\frac{1}{v}+a=a+x^{\frac{1}{3}}\ldots(1).$$

$$\therefore u=\frac{1}{\sqrt{2}}\tan[3\sqrt{2}(a+x^{\frac{1}{3}})]\ldots(2).$$

$$\therefore y=-\frac{6\sqrt{2}}{6x^{\frac{2}{3}}\tan[3\sqrt{2}(a+x^{\frac{1}{3}})]+x^{\frac{1}{3}}\sqrt{2}} \text{ is the equation.}$$

From (1), $u=\frac{1}{\sqrt{2}}\tan\left[\frac{3\sqrt{2}(av+1)}{v}\right]$.

$$S=\int\sqrt{[1+(du/dv)^2]}dv=\int_{\frac{1}{2}}^{1}\frac{1}{v^2}\sqrt{v^4+9\sec^4\left[\frac{3\sqrt{2}(av+1)}{v}\right]}dv.$$

294. Proposed by C. N. SCHMALL, New York City.

Examine the function, $f(x)=\frac{(x-1)(x-2)}{(x-3)}$ and determine why its *minimum* value is *greater* than its maximum.